Comments on the (draft) National Energy Policy

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The National Energy Policy (NEP) by NITI Aayog is meant to be an integrated policy for Energy, and the draft policy is a comprehensive document that touches on most aspects of energy policy. However, a number of key issues have not made the policy deliberations, including fundamental issues of markets, regulation, competition, etc., not to mention tradeoffs that are inevitable in a holistic view of the domain. While major energy sector issues are discussed very well, in many places the document reads like a research and advocacy note, leaving some of the challenging, but vital, details aside. These include, but are not limited to, having a *roadmap or action plan* for the energy system over 2022, 2030 and 2040 term horizons.

The absence of 2030 from the evaluation scale also makes it difficult to compare with most contemporary research, including that on Climate Action. Certain targets such as electrification goals and coal production/demand targets are at variance with official announcements and greater clarity on the rationale behind this will be helpful. Certain assumptions made on the nature of macro-economy and growth structure throw open some doubts. Especially in case of industries, energy demand growth by 2040 does not reflect the ambitious assumption on manufacturing share doubling by then. It may be that some *internal consistency* is required in the models.

Many numbers draw from models especially NITI's own IESS, which are useful tools but should not be viewed as inevitable or even baseline. In fact, this issue of "baseline" or BAU (business as usual) is an important one. In the NEP, the GDP is assumed to grow at roughly 8 per cent for 25 years. This is both high and there is limited clarity on how a lower GDP rate would impact energy demand. It's worth emphasising that past performance (elasticity, efficiency, etc.) are limited predictors for the future.

Throughout the draft NEP, line-item targets for electricity, renewable energy (RE), etc. are taken as a given, and the plan appears to work around such targets. Realistically, *some of these targets may be delayed or pushed back*, e.g., even the government's own Central Electricity Authority (CEA) does not take 175 GW RE as being achieved by 2022 but later on in their electricity planning. Instead of focusing on targets per se, NEP as well as the government overall may do well to spend more energy focused on enabling environments and frameworks, which include more nimble and flexible systems for managing a changing landscape (one with higher RE, smarter technology, disruption from the edge, carbon constraints, etc.) NEP does this in parts, e.g., the critical lens put on energy and electricity pricing – this only scratches the surface.

To better understand India's Energy Policy, it may be useful to have a comprehensive comparison of global plans and projections. *This would show if India's expectations are ambitious, impossible, or just BAU. More than just supply and demand, pricing, regulation, etc. should also be covered.*

For any document that is integrated, one has to *move beyond looking at energy in silos*, which is done in some parts but nowhere near enough. E.g., if we consider the move towards electric vehicles, and the government's ambitious targets, these, naturally, have enormous uncertainty. These also have implications that impact the energy mix across petroleum vs. electricity but even within electricity. This is before we consider issues such as the exchequer implications of policies, e.g., the fact that taxes on petrol and diesel are measured in the percentages of GDP level. Electricity is not taxed nearly the same. Such issues of *tradeoffs* deserve more discussion in the NEP.

Lastly, while the document is reasonably comprehensive in coverage/topics, there are a lot of details and assumptions that aren't transparent. All figures should show calculations, assumptions, sources, etc. Importantly, there are a large number of unknowns even today, forget future uncertainty. E.g., even today, do we know the demand for power (existing consumers) by Time of Day? How this can change with rising affluence? How much consumers have as price elasticity? etc. The NEP could be a place to list out the issues of unknowns and missing data, e.g., actual RE generation including for small-scale generators.

The chapter and/or section-wise comments follow:

- 2.9.2 LED savings: "20 GW can save nearly 100 billion kWh worth annually". That means each light is operating for 5,000 hours per year. Seems quite high. For calculating the LED energy savings, is it assumed that these replace incandescent bulbs?

- 2.9.5 “while current share of manufacturing in the GDP will double to 30% by the year 2040” – seems like a fait accompli. That means if GDP grows at M, manufacturing will grow at 2M?
- Table 1: cooking is a major shift. The reduction in energy over 10 years is very high – 2017 offers a mid-course estimate (if available). What are the details of this conversion? Shift to LPG? Solar cookers are theoretically available but culturally not accepted. Is there any use of “efficient chulhas” which retain biomass but use far less?
- Can all the tables show 2030 numbers as well?
- In table 1, industrial energy growth is not commensurate with doubling of manufacturing output

Can Table 1 show CAGRs in addition to just numbers (TWH)?

Sectors	2012	2022	2022	2040	2040
TWh		BAU	Ambitious	BAU	Ambitious
Buildings	238	9.09%	8.23%	7.43%	6.69%
Industry	2367	5.41%	4.28%	4.79%	4.09%
Transport	929	6.45%	5.77%	5.19%	4.57%
Pumps& Tractors	237	5.96%	5.05%	4.09%	3.32%
Telecom	83	4.67%	4.10%	3.32%	2.46%
Cooking	1072	-2.54%	-4.39%	-2.52%	-2.92%
Total	4926	4.56%	3.50%	4.25%	3.58%

- Without knowing the GDP growth listed per se, this indicates that INDCs are relatively easy to meet, even under BAU conditions, or even lower with decarbonizing, PLUS the fact that disproportional improvements were met between 2005 and 2012).
- Table 2: There is a dual challenge of proposing a national (much larger) balancing area for high renewables. It will require far more transmission capacity to allow flows across longer distances. Can be done. At a cost. This is why even the US, though synchronous, has relatively small/modest balancing regions (RTOs) – multi-state but not the entire grid.
- NEP sets its target for universal electrification in 2022, whereas the Ministry says it can be achieved by 2018. Is this due to disparity in definition, or just sticking to the older targets?

- The premise of oil and gas convergence in shares globally appears to be simplistic for India – the use of gas is HEAVILY determined by not just availability of cheap gas (which happened before the present share gas in the US with North Sea Gas) but also use for heating – a minimal demand in India. How is gas priced? That really impacts its demand.
- Energy Efficiency and Conservation: Would be useful to consider working in Resource Efficiency, especially in context of industry and building materials, which not only utilizes less primary material but almost invariably leads to significant energy savings. Also, specificities of consuming sectors and room for improvement are not adequately covered.
- 3.9.9. The unorganized sector must be first equipped with technical knowhow and accredited with product rating agencies (BIS/ BEE) before setting PAT targets
- 3.10.4 Energy Efficiency 'related' institutions, include state designated agencies and utilities; large scale investment and programmes in skill upgradation/testing/pilots, and signaling of clear objective towards energy efficiency is required
- Box 1: Division between 'real' and 'assumed' issues bit jarring for the reader. It may also be noted that rural customers subsidise the urban customers during peak periods via differential supply or quality of supply (in parts of India).
- Box 2: NEP does well to acknowledge rural consumer behavior patterns and shifting away from a piecemeal 'efficient cookstoves' to fuel switching, which is the need by the poorest. Subsidies should be realigned and sharpened.
- Box 3: NEP will do well to acknowledge the winners and losers in the process of large scale RE and recommend mechanisms to balance out the pain. Also, some discussion and way forward on balancing technologies will be good.
- Table 3 would benefit from imports of coal, oil, and gas being shown side-by-side – domestic production is NOT a bottleneck for demand, and domestic availability is unlikely to have major price arbitrage, except in "cheaper" but lower quality coal.
- 4.1: While it is good that the exporting potential of refineries is encouraged, recommendations should be provided on how they can be made more energy efficient (including bringing them under PAT framework), since refineries are a significant consumer of energy.
- 4.5.2. Most gas based power in India is via combined cycle, whereas open cycle may be preferable for ramping. Unless these can be converted (and not all can), new gas plants might still need to be built.
- Fig. 2: Coal production by 2040 is lower than GoI target by 2020. Merits a comment.

- 5.2- Almost no change between 2016 and 2040 on the upper end of the scale? New technologies, process shifting, fuel switching, etc.- will they not reduce coal demand appreciably on the thermal side? Similarly, high RE and efficient TPPs will reduce coal share for electricity, which is where it is primarily consumed.
- 5.3: Should market based competition be on fuels alone or on energy characteristics (base load, etc.) and are renewables included in this competition?
- 5.4.7: If different CIL subsidiaries were to compete on prices, how will the question of production allocation (quality of the resource, extraction costs and methods, etc.) be tackled?
- 5.4: No commentary on MoP/ GoI's production capacity plans?
- Re. coal, 5.5.2, it claims "As long as the delivered price of domestic coal is lower than that of imported coal, no imports would take place." This is not true. Imports have a higher quality which is not just preferred but even mandatory for some boilers spec'ed to such coal.
- 5.5.7 – not sure how/why that is true ("The present policy of reverse bidding has the further drawback that it results in a loss of royalty income to coal bearing states"). Reverse also went into forward bids. In addition, what goes to the states as standard royalties, cess, etc. remain. The reverse bids were meant to be only to the level of mining costs, with starting levels set accordingly. Lower prices would (in theory) only be reflective of lower mining costs where that efficiency was passed on entirely to the power plant side (and thus consumers).
- 6.2 "the NEP proposes gradual withdrawal of the provisions of 'must-run' status and other supports such as non-levy of inter-State transmission charges. It is envisaged that as consumers become agnostic to the source of power, renewable energy will soon blend with conventional power and markets will determine dispatch rather than policy levers." Not sure must-run is the main distortion – lack of unified pricing norms (2-part vs. average) is the bigger distortion. IF you truly have a market, then based only on marginal costs, RE is mostly zero (though coal can also be "must run" due to technical reasons). Understanding issues of energy vs. capacity markets is a key need, and this is a complex topic.
- 6.2: are these recommendations for RE based on an analysis? If so, is there a time-horizon for when RE will compete unfettered under current market structure? (This has links to the above comment)
- 6.3: It would be good to elaborate ways in which hydro development can reduce the losses to inhabitant communities; resettlement and rehabilitation policy is a must.

- 6.5.3. If off-grid is short term solution, difficult to coax private sector into it since the capex is large and may have a longer payback period than when grid connection is envisaged.
- 6.5.5. Good ideas to move beyond RPOs and RECs. Must also look at systems level costs of RE instead of just the levelized (LCOE) costs.
- 6.6 Cultivating first generation biofuels has largely back-fired. India should focus more on processing byproducts (molasses, etc) and developing next gen biofuels/
- 7.1 Didn't the NDCs NOT use 2030 as the year for nuclear but 2032? Just a minor issue.
- Won't there be a retirement or at least some derating of older nuclear plants by 2030? So, some of the capacity won't be available (a few GW)?
- 7.4.2. Language isn't clear. AERB isn't as independent as one may think, including the fact that it reports many things to DAE/AEC Chairman.
- 8.1 Aren't average numbers misleading for consumption? 1 kWh per capita (or HH)? What about the variance? Also, if we have double the household size than some countries (esp. for rural) and homes are, say, 1/4 of consumption, then that means the electricity consumption could/should be 1/8 lower than developed regions AT "SATURATION".
- 8.3 Not sure what is the basis for this: "Heat is estimated to account for 50% of all energy demand in Industry, and can easily be supplied efficiently by power (preferably through renewable sources) rather than burning solid or liquid fuels" It depends on what is the share of primary versus secondary industry – former needs heat. It's also not clear why electricity is the best way to provide heat – solar thermal, maybe, but otherwise? PV is very time dependent, for example. Burning something is *today* cheap worldwide (ignoring the externalities). Also, in several applications, critical temperatures are not easily met by solar thermal. It can be used only for smaller applications (eg. Textiles and paper)
- 8.6.1 – "Electricity purchases from discoms usually require long terms power purchase agreements (PPA)" That's only ONE model of transaction. A liquid market, in fact, does NOT want PPAs.
- 8.6.2 DISCOMs do not ever go bankrupt. They have losses, but going bankrupt means you are forced to change (e.g., go into restructuring, administration, receivership, etc.). This feedback is missing. Also, at the state level, it may be a policy decision to provide for free/subsidized to certain consumers, but the governments HAVE to make good the deficit (deviation from ARR). This needs to be done in a timely and orderly manner, because it is difficult to see certain subsidies going away. But they should be monitored

and restructured to give most bang for the buck, and also reach the intended beneficiaries.

- 8.6.4. As noticed in the case of Maharashtra's SCEF, any taxes or additional levies beyond the regulator approved slab are in violation of the Electricity Act, 2003. So the proposal for taxing high paying categories and redistributing requires legislative changes.
- 8.9.1 Losses of DISCOMs – what is the year and what is the basis for this (50 paise losses)? Is that gross or net losses (i.e., on the units sold and paid for or just entering the system)?
- 8.9.3 The message is not clear—should long-term capacity adequacy or shorter term market based efficiency concerns dominate? When is the cross-over?
- 9.5 The point about overly competitive bids in solar sector and possibly misplaced expectations need to be stressed and regulatory action/oversight urged. This is before addressing issues of quality as well.
- 9.5 Good to bring in Health, Safety, and Environment issues – how can we increase coordination for the same so it's not an either-or or antagonistic process like often seen?
- 10.2 Local service obligations are important and key to achieving wider buy-in for infra policies.
- 13.2 Not just oil, gas and RE, even coal supplies from abroad need to be secured owing to operating parameters of super and ultra-super critical TPPs that necessarily require some imported coal blending (at least in the near term).
- Chapter 14, Air Quality: Some discussion on pricing mechanisms to check both and extent and distributional inequities related to air quality is required, as these are easier to implement than market-based carbon pricing mechanisms
- Annex I: GDP growth rate of 8% till 2040 highly ambitious based on past trends and outlook.
- Table 6 – there is a ~tripling of buildings electricity consumption in 10 years? That comes to 9.8% annually. Seems a bit high (2012-22). Growth of buildings vs. organic growth are important distinctions we don't have good data for.
- Table 6 – doesn't NEP directly say EVs are a big unknown? So there should be more ranges shown for the same. Also, electricity is increasing a lot – will food production remain so? What about efficiency, crop choices, etc.?
- Electricity demand: Insignificant improvement in electricity efficiency in 2040 versus 2022. There is a technical limit to substitution of electricity for fuel. Keeping that in

mind, it seems unlikely that so much electricity growth is warranted even in Ambitious scenario.

- Table 10 – knowing capacities is not enough, PLFs matter. Also, ToD matters to bring together energy and capacity.
- Emissions Intensity reduction by 2030 is very high; possibly biased by high growth rate assumptions.
- Ambitious scenario shows electricity growth over 25 years to be 5.5%, while the intro section (assuming that is BAU) shows 6.2% (4.5 x growth). While aggressive scenarios are lower energy, aren't they higher electricity share? The math needs transparency and clarity. This links to the issue flagged before, where industry is assumed to double in share of GDP, but yet the BAU growth of industrial energy has a much, much lower growth.